

OBSERVATIONS
UPON THE
ORIGIN
OF THE
MALIGNANT BILIOUS, OR
YELLOW FEVER
IN PHILADELPHIA,
AND UPON THE
Means of Preventing it :
ADDRESSED TO THE
CITIZENS OF PHILADELPHIA
By Benjamin Rush.

PHILADELPHIA:

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1799.

OBSERVATIONS,

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HAVING laboured nearly six years to no purpose, to persuade the citizens of Philadelphia that the yellow fever is of domestic origin, I had concluded to desist from all further attempts to produce conviction upon this subject; but a retrospect of the scenes of distress which I have witnessed from that terrible disease, and the dread of seeing them speedily renewed, with aggravated circumstances, have induced me to make one more effort to prevent them, by pointing out their causes, and remedies. I anticipate from it, a renewal of the calumnies to which my opinion of the origin of our annual calamity has exposed me; but these will be less difficult to bear, than the suppression of truths which involve in their consequences the prosperity of our city, and the lives of many thousand people, whom poverty and despair will finally compel to
become

become the unwilling victims of the fever, should it again prevail in our city.

Of the Remote Causes of the Yellow Fever.

This disease is the offspring of putrid vegetable and animal exhalations in all countries.—It prevails only in hot climates and seasons.—The sources of it in Philadelphia are chiefly the following—

1. The docks ; these contain a large quantity of filthy matters in a highly concentrated state. They are first acted upon, by the heat of the sun, and hence sailors and the inhabitants of Water street, are generally the first persons who are affected by the yellow fever every year. It is derived so frequently from the docks in New York, that it has obtained there, the name of the *dock* fever.

2. The foul air of ships.

3. The common sewers. A yellow fever was produced by a large sewer in Calcutta. It was afterwards prevented by closing it up, and removing the filth of the city in another way.

4. The gutters.

5. Dirty

5. Dirty cellars and yards.—Foul air is sometimes generated in cellars which produces sporadic cases of fever in all seasons of the year. Swen Warner died of a yellow fever on the 30th of January 1799, received by breathing the air of a cellar which had been shut up for several months.

6. Privies. An epidemic fever was once traced to this source in the city of Frankfort in Germany.

7. The putrefying masses of matter which lie in the neighbourhood of the city, and

8. Impure pump-water.

All the physicians in our city agree in deriving the common bilious fever and dysentery from these sources; now as these diseases have, we are told, by the College of Physicians, “lately very much diminished,”* and as the putrid exhalations still continue, the presumption is, that they produce our higher grade of bilious, which is the yellow fever.

Of

* Facts, and Observations, p. 24.

Of the Cause of the Yellow Fever not occurring more frequently before the Year 1793.

It has often been asked, “Why did not the yellow fever prevail in Philadelphia before the year 1793, particularly in the year 1778, when it was left in a more filthy state by the British army than it has been at any time since?” To this, I answer, that for the production of our pestilential disease, three things are necessary, 1. Putrid exhalations, 2. An inflammatory constitution of the atmosphere, and 3. An exciting cause, such as great heat, cold, fatigue from riding, walking, swimming, gunning, or unusual labour, intemperance in eating, or drinking, ice creams, indigestible aliment, or a violent emotion of the mind. The first cause acts but feebly without the concurrence of the second, producing mild diseases only, such as common remitting and intermitting fevers. By the co-operation of an inflammatory constitution of the air, we observe not only common bilious fevers, have become malignant, but all those diseases which are occasioned by the sensible qualities of the air, have assumed a more violent character. This has been remarked by most of the physicians of Philadelphia for several years past. The pleurisy, rheumatism, gout, hives and several other diseases, require remedies of twice as much force to subdue them,

them, as they did ten years ago. On what circumstances this change of the atmosphere depends is not known. But the fact is certain. It was taken notice of by Hippocrates two thousand years ago, and is mentioned over and over in the writings of Dr. Sydenham. The records of medicine prove, that it has continued from one year, to fifty-two years in different countries. Dr. Sims has given a long and interesting account of these inflammatory constitutions of the atmosphere from the year 1590 to 1782, in the first volume of the ~~Manchester~~ *medica* memoirs, from which it appears that they were sometimes general over Europe, and at other times confined to particular countries. The pestilential constitution of the air in the United States began in 1791. This I infer from the yellow fever making its appearance ⁱⁿ that year in New-York—It prevailed in Charleston in 1792, and it has been epidemic in one or more of the cities and country towns* of the United States every year since.

We

* It has been asserted, that this fever is confined exclusively to our sea ports. This is an error. It has prevailed since the year 1793 in many of the villages of New England, and of the southern states. On the Genesee river in the state of New York, it has become so prevalent as to acquire the name of the *Genesee* fever. The bilious fevers which prevailed in all the above places before the year 1793, were of a

We observe the effects of changes in the qualities of the atmosphere not only upon diseases, but upon animal and vegetable life. Insects of different kinds have lately appeared and multiplied in an unusual manner, and the fruits of the earth have ripened, and decayed in many instances sooner than in common years. These facts have been noticed by the farmers in every part of the United States. The uncommon mortality in the summer and autumnal months, among horses, cattle and the cats, for several years past, is an additional proof of a change in our atmosphere. It has arisen probably from the same cause which has increased the mortality of our annual epidemic. As a further answer to the question under this head, it might be asked, why was not the fever imported oftener before the year 1791? It is seldom absent from the West-India islands. It raged in most of them during the two wars previous to the present, and yet but one instance occurred of it in the United States in those two

mild nature, and seldom mortal. They have lately disappeared, or are very much "diminished," and have been succeeded by a fever which frequently terminates in death in five days with a yellow skin and a black vomiting. These facts have been communicated to me by letters, from physicians, and by other gentlemen, who have been eye witnesses of them. To doubt of their truth, would lead to a disbelief in human testimony, upon all other subjects.

two periods of seven years each, and that was in Philadelphia in the year 1762. The intercourse between our cities and the islands during that time was extensive and constant, particularly in the war between the years 1756 and 1763. Quarantine laws then existed in but few of our cities, and where they did, they were feebly executed or eluded every day.

It has been asked,

Why does not the yellow fever prevail every year in cities, where the filth is always the same in its quantity and quality. To this I answer, that filth may be in two states in which it will not produce this disease, viz. a *dry*, and a *liquid* state. From excessive heat or from heavy rains, it is often in one of those conditions in our cities. When this is the case, they escape a visitation from this disease. It is only when filth is acted upon by a hot sun in a *moist* state that it produces fevers. The Neck below Philadelphia which has been subject to the bilious fever, time immemorial, was uncommonly healthy in the autumn of 1793; owing to the low grounds there being completely dried by the hot weather of that season. Fell's Point near Baltimore I have been informed escaped the yellow fever in 1798 from a similar cause.

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I shall illustrate the origin of the yellow fever by a familiar simile. The foul air of our city may be compared to gunpowder with which the bodies of our citizens are charged from the beginning of summer. The atmosphere may be compared to sparks of fire. Heat, cold, fatigue, intemperance and the other exciting causes which have been mentioned, may be compared to a *hand*, which combines these sparks, with the gunpowder accumulated in our bodies. The concurrence of all these causes is necessary to produce a yellow fever. Putrid exhalations act but feebly upon the body, unless they are aided by the inflammatory activity of the atmosphere. This atmosphere in like manner, acts but feebly upon the body without the concurrence of putrid exhalations. Both of them for the most part, require the *hand* of an exciting cause to produce the disease. An exciting cause without them, is harmless, or induces only a transient indisposition.

If putrid exhalations produce the yellow fever, it has been asked, why are those neighbourhoods sometimes healthy that are constantly exposed to their offensive smell? This question may be answered by resorting to the effects of habit upon the system, which renders it insensible after a while, of irritating impressions. The noxious matter which produces

duces the yellow fever exists independently of smell, and is probably not formed till after that process of fermentation is ended, which evolves the factor from putrefying animal and vegetable substances. This factor, like the rattle of the snake, seems to have been intended to give us notice of our danger, and to remove, or fly from the filth which emits it. It is possible it may in some cases predominate so much in its action upon the system over that matter which produces the fever, as to defend the body from its morbid effects. It is thus, the *constant* stimulus of spirituous liquors has been found effectual in some instances in preserving *habitual* drunkards from the yellow fever.

Is the Yellow Fever a Contagious Disease?

To answer this question, it will be necessary to remark, that contagion is of two kinds.

1st. It is *secreted* as in the small pox and measles, in which state it acts uniformly and without the aid of exciting causes, upon persons of all ages and constitutions who have not been previously exposed to it, and is not controuled by the obvious changes in the weather.

2dly.

2dly. It is derived from certain matters discharged from the body which afterwards by stagnation, or confinement, undergo such a change, as to partake of the same nature as the putrid exhalations which produce the fever. If the breath, perspiration, and other excretions of a person in a yellow fever be confined in a small close room, they may produce a similar disease, especially when they act upon a body previously debilitated by grief, or fatigue. But they are generally inoffensive, where the sick are accommodated in open well ventilated situations. Out of upwards of one thousand persons who have carried this disease into the country from our cities, there are not more than three or four instances to be met with, of its having been propagated by contagion. In the city hospital of Philadelphia, there was no instance of this disease being contagious in 1793, 1797, and 1798. The fever of which Dr. Cooper died in the hospital last year, Dr. Physick assures me was derived from the exhalations of Water-street, which place he visited a few days before he sickened, in order to examine the state of the air in that unhealthy part of the city. The disease perished when carried from Fell's Point to Baltimore in 1794. The same fate attended it, when it was carried from the places in New York and Boston in

in which it was generated, to distant parts of those cities. Clothes impregnated with the effluvia of a person who had died of the yellow fever might produce a similar disease, but it would be only in consequence of those effluvia partaking of the nature of putrid matters derived from any other animal source.* The same thing may be said of the effluvia emitted from a putrefying dead body.

In the first settlement of the West India islands, pains were taken by several physicians, to prove that the yellow fever was imported from Siam into the West Indies. I was educated in the belief of this opinion, but the testimony of many learned, and eminent modern physicians, has convinced me that it is a vulgar error, and that the disease is
generated

* In the year 1793 I supposed many cases of the yellow fever to be derived from contagion, which I now believe were produced by noxious exhalations. I did not at that time know, the distance to which those exhalations might be conveyed. From my ignorance of this fact, I was misled by those authors who suppose the disease to spread in the West Indies by contagion. Many late inquiries have convinced me, that this is not the case. There is a smell of a peculiar kind emitted by persons in a yellow fever which sometimes produces disagreeable sensations in the attendants, but similar effects are produced from a hundred other smells which do not occasion a fever.

generated there as it is here, by putrid exhalations. To the names of Drs. Huck, Hillary, Hunter, Hector, M'Lean, and Clark, I shall add those of Doctors Jackson, Borland, Pinkard and Scott, physicians to the British army in the West Indies, who lately visited this city. They all denied the contagious nature of the yellow fever in the West Indies.*—In those cases where a fever appeared to spread

* The following extract from Dr. James Clark's history of the yellow fever in the island of Dominica, in the years 1793, 4, 5, 6, contains an epitome of the opinions of all the medical gentlemen whose names are mentioned with his, upon the origin and noncontagious quality of this disease.

“ According to Dr. Lining's account of this fever in Charleston, South Carolina, communicated in the Essays Physical and Literary, Vol. 2, it appears to have broken out there in the years 1732, 1739, 1745 and 1748; he thinks it was always imported from the West Indies; but gives no proof, nor even reason, in support of this opinion, which does not seem to be well founded.

“ At Fort Royal, in Martinique, where there is a great prevalence of mephitic effluvia, arising from the marshy ground at the back of the town, it generally broke out in the summer or autumnal season, on the arrival of troops from France, or of a number of seamen, who had never been in the West Indies before; and the same thing happened at Point a Petre, in Grand Terre, Gaudaloupe, almost annually, and from the same cause; but it was never looked upon as *an infectious*

spread by contagion in vessels at a distance from the shore, Dr. Scott informed me that there was always

disease; nor did it ever spread among the natives of the towns nor among those who were seasoned to the climate; nor was it ever carried from thence to the other islands. In this island few cases have occurred for these last twenty years; and these have chiefly been at Prince Rupert's Head, where from the stagnated water in a large morass near the town and fort, the marsh miasma prevails in a high degree. Since the swampy places which were in the town Rousseau have been filled up, this fever has been seldom observed; but previous to the year 1792, we had generally violent thunder storms—heavy rains—or severe gales of wind, during the autumnal season.

“ M. Desportes, in his *Histoire des Maladies de St. Dominique*, during the fourteen years that he kept a journal of the diseases at Cape François and Fort Dauphin, found that this fever broke out constantly in those towns upon the arrival of new-comers from France, and among these, only such as had not been formerly in that climate. In and about these towns, during these fourteen years, viz. from the year 1732 till 1746, there were a great many inlets of the sea, where the water continued long in a stagnated state, which in so hot a place produced very offensive exhalations; to these he attributes this fever, and the bilious and other diseases that prevailed at the same time.

“ From a firm belief that this disease is by no means contagious in our island, the sick are not abandoned by their friends, nor neglected by their attendants, which contributes much to the recovery of many, who would otherwise have been

ways reason to believe it to be the common ship fever which is every where admitted to be of contagious nature.—The ship, goal, and hospital fever mean one and the same disease. It is produced by exhalations from *living* bodies in a crouded, filthy, or debilitated state. The fevers which have been imported into Philadelphia from Holland and Ireland in passenger ships, were of this nature. It is sometimes confounded with the yellow fever by writers, but it is materially different from it.

The power which heavy rains, and frost have of *destroying* our fever, clearly prove that it does not spread by contagion. We have seen it checked three times, in three different years by frosty nights. The cold in these cases cannot act upon the disease in our houses, and of course it does not alter the quality of the matters discharged from the bodies of the sick. It acts only upon the putrid exhalations which float in the atmosphere.

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lost for want of care.” In Dr. Jackson’s treatise upon the fevers of Jamaica, he supposes the bilious and yellow fever to be different diseases. Since his late return from the West Indies, and this country, he has published the result of his observations upon the yellow fever, in which he retracts the opinion of its being a specific disease, and proves it to be a high grade of bilious fever.

The interests of humanity are deeply concerned in the admission of the rare and feeble contagion of the yellow fever. Hundreds have perished by being deserted by their friends in situations in which the disease could not have been taken by contagion, and where there was no danger to the attendants from putrid exhalations, either from the sick, or the adjacent neighbourhood. Many people have perished likewise in places exposed to putrid exhalations, who have believed themselves to be safe, because they kept at a distance from the sick.

Can the Yellow Fever be Imported?

I once thought it might, but the foregoing facts authorize me to assert, that it cannot, so as to become *epidemic* in any city or country. There are but two authorities on which the belief of this disease being imported, rests. These are Dr. Lining's and Dr. Lind's. The former says it was imported into Charleston in 1732, 1739, 1745 and 1748. The latter says it was conveyed into Philadelphia where it afterwards became epidemic, by means of the clothes of a young man who died in Barbadoes. No circumstances of ships, or names are mentioned with these assertions to entitle them to credit, and from the facility with which vague reports of the foreign origin of this disease have been admitted and propagated

gated by physicians in other countries, there is reason to believe the assertions of those two physicians are altogether without foundation.—The College of Physicians of Philadelphia after two weeks investigation, were unable to discover any ships, clothes, or sick person, that could have introduced the disease into Philadelphia in the year 1793. The Academy of Medicine have clearly proved, by many documents, that the disease was not imported in the years 1797 and 1798. The origin of a few cases, reported by Dr. Griffitts and other members of the College of Physicians, which have lately appeared in our city, has in vain been sought for from a prize sloop of the Ganges. Two affidavits of Messieurs Hill and Ingersoll, prove that she had been healthy in the West Indies, and that no person had been sick on board of her during her voyage, nor after her arrival in our port. Equally unsuccessful have been the attempts to derive those cases, from beds, and blankets infected by the fever of last year. In Boston, Connecticut, New York, Baltimore, Norfolk and Charleston, both physicians and citizens have long ago rejected the opinion of the importation of the fever. Some physicians suppose it possible for the contagion of this fever to adhere to the timbers of ships that have sailed from West India ports, and that it may be propagated from them to a whole neighbourhood, although

although houses, and even streets, interpose between them. This opinion is too absurd to stand in need of refutation. Indeed every thing that relates to the importation of this fever is contrary to reason and facts.—It is an error, substituted in the room of a belief that all pestilential diseases were derived from the planets.—The existence of a health-law founded upon this error, in the close of the eighteenth century, and in a city abounding with literary institutions, will appear incredible to posterity. Thinking men alone will discover its possibility, in their knowledge of the nature of the human mind. It is possible this law may in the course of many years be the means of preventing the disease being received, in a solitary instance.—To enforce it under this circumstance, at the expense of our commerce, is to imitate the conduct of the man, who in attempting to kill a fly upon his child's forehead with a hammer, knocked out its brains.

It has been said, if we admit the yellow fever to be of domestic origin, it will ruin the credit and commerce of our city. The reverse of this opinion is true; for by admitting that it is generated among ourselves, we shall soon remove its causes, whereas, by supposing that it may be imported, and acting accordingly, we shall naturally be led to neglect

glect the removal of the sources of putrid exhalation, and thus after driving our commerce to other ports, we shall entail the disease upon future generations. Many of the cities of Europe, and of the West-Indies, that once generated pestilential diseases, now enjoy an exemption from them by adopting measures for removing their causes. The hereditary cleanliness of the Hollanders was imposed upon them by the diseases to which their country was formerly subject from putrid exhalations.—The town of Harrisburgh in Pennsylvania, lost more of its inhabitants in proportion to their number, than the city of Philadelphia by the yellow fever in 1793. The cause of this great mortality was traced to a mill dam. It was soon afterwards removed, and the town has ever since been healthy. It is of the utmost consequence for the cities of the middle and northern states of America to adopt measures of strict and universal cleanliness, inasmuch as the disease may be taken as often as our inhabitants are exposed to its sources. In the West-Indies, the constant action of the sun and of putrid exhalations upon the bodies of the natives and old settlers, render them for the most part, insensible to any morbid impressions from them; hence the disease is never taken a second time except by persons who have left the islands, and after spending two or three years in
 a cold

a cold climate, have returned to them. New comers are the principal victims of the highest grade of their bilious fever. The winters in North America, by destroying the habit of insensibility to heat, and putrid exhalation induced by the previous summers, place our citizens every year in the condition of new comers in the West-Indies, or of persons who have spent two or three years in a cold climate. This circumstance increases the danger of depopulation to our city from our annual epidemic, and should produce corresponding exertions to prevent it.

Of the Means of Preventing the Yellow Fever.

1. Let the docks be immediately cleaned, and let the accumulation of filth in them, be prevented in future, by conveying water into them by a passage under the wharves, or by paving them with large flag stones inclining in such a manner towards the channel of the river, as that the filth of the streets shall descend from them (after it falls into the docks) into the river. This method of paving docks has been used with success in the city of Brest. The street now known by the name of Dock-street once exposed a large surface of filth to the action of the sun. Its neighbourhood was
more

more sickly at that time, than any other part of the city. By means of the present arch over that filth, Dock-street has been exempted from an unusual number of sick people during the summer and autumnal months.

2. Let every ship that belongs to our port be compelled by law to carry a ventilator. Let all such ships as are discovered to contain foul air in their holds, be compelled to discharge their cargoes before they reach our city, and let the ships in port, be compelled to pump out their bilge water every day.*

3. Let

* Many of the citizens of Philadelphia have deserted the College of Physicians, by admitting the foul air of a ship to be the cause of a yellow fever. The College derive it wholly from a *specific* contagion formed by a peculiar process in the body similar to that which takes place in the small pox. The foul air produced by putrefaction, whether generated in the hold of a ship, or in docks, or common sewers and gutters, is of the same nature, and acts in the same manner in producing the yellow fever.

A new hypothesis has lately been broached to prove the importation of this disease. It makes foul air a necessary *recipient* for the contagion, before it can act upon the body. The small pox and measles require no such recipients to enable them to produce a fever. The foul air is sufficient to induce all the effects that have been ascribed to it, without calling to its aid a mixture with a supposed specific contagion.

3. Let the common sewers be washed frequently with streams of water from our pumps. Perhaps an advantage would arise from opening them and removing such foul matters, as streams of water are unable to wash away.

4. Let the gutters be washed every evening in warm weather. By frequently washing the streets and pavements the heat of the city would be lessened, and thereby one of the predisposing causes of the fever would in some measure be obviated. The use of water for the above purposes, has become more necessary since the streets and gutters have been so closely paved; for the filth which formerly soaked into the earth, is now confined, and emits its noxious vapors into the atmosphere.

5. The utmost care should be taken to remove the filth from the yards and cellars of every house in the city. Hog-styes should be forbidden in yards, and the walls of cellars should be white-washed two or three times a year, and their floors should be constantly covered with a thin layer of lime.* White washing the outside of houses in sickly streets, would probably be useful.

Let

* I attended two persons in this city last year in one house with the yellow fever, in the yard of which, and directly under the window of the back room was a barrel fill-

6. Let the privies be emptied frequently ; and let them be constructed in such a manner as to prevent their contents from oozing through the earth so as to contaminate the water of the pumps. The famous Ambrose Parey ascribed one of the plagues of Paris wholly to foul air, and impure water. Mr. Latrobe in a note, in his proposal for his present important undertaking, has very properly pointed out the impurity of our water as one of the remote causes of the yellow fever.—Happy will it be for the citizens of Philadelphia if by means of that gentleman's plan for supplying the city with river water,

ed with cucumber and melon rinds, which had been accumulated there in the summer of 1797. The stench from them after a rain, was perceptible all over the house.

Some of the best housekeepers in our city, burn all their offal vegetable and animal matters in their kitchen fires. If this practice were universal, it would contribute much to the health of our city. Many years ago, housekeepers in Amsterdam were restrained by law from throwing the offals of their kitchens into their canals. The late increase of bilious fevers in that city has been ascribed to that law not being faithfully carried into execution.

Fire wood should never be confined in cellars in the warm months, in a green, or wet state. It emits when heated, an unwholesome vapor which has been known to produce a fever. Log huts and cabins, the second year they are inhabited, often become unhealthy from the decay of the bark of the logs of which they are composed.